PTO 08-5844

CC=JP DATE=19900410 KIND=A
PN=02098415

METHOD FOR MANUFACTURING COMPRESSION MOLDING HAVING MULTILAYER STRUCTURE
[Taso kozo asshuku seikeibutsu seizo hoho]

Kiyoshi Kawaguchi, et al.

UNITED STATES PATENT AND TRADEMARK OFFICE
Washington, D.C. June 2008

Translated by: FLS, Inc.

PUBLICATION COUNTRY	(19):	JP
DOCUMENT NUMBER	(11):	02098415
DOCUMENT KIND	(12):	A
PUBLICATION DATE	(43):	19900410
APPLICATION NUMBER	(21):	63250943
APPLICATION DATE	(22):	19881006
INTERNATIONAL CLASSIFICATION	(51):	B29C 43/20
INVENTORS	(72):	KAWAGUCHI, KIYOSHI; YAGISHI, HIDEKI
APPLICANT	(71):	HIROSHI UENO
TITLE	(54):	METHOD FOR MANUFACTURING COMPRESSION MOLDING HAVING MULTILAYER STRUCTURE

Specifications /1*

1. Title of Invention

Method for Manufacturing Compression Molding Having Multilayer Structure

2. Claim(s)

1. A method of manufacture characterized by being comprised by generating a composite synthetic resin material containing an inside synthetic resin layer and an outside synthetic resin layer surrounding the flank of this inside synthetic resin layer, and compressing said complex synthetic resin material in the axial direction and compression molding it into a compression molding having a multilayer structure with a prescribed shape.

2. The method of manufacture of Claim 1 in which the inside synthetic resin layer and the outside synthetic resin layer are continuously extruded through a composite extrusion flow pass comprising an inside synthetic resin layer extrusion flow pass and an outside synthetic resin layer extrusion flow pass surrounding this inside synthetic resin layer extrusion flow pass, and cutting the extruded composite synthetic resin in the traverse direction to the axial direction.

3. The method of manufacture of Claim 1 or 2 wherein the inside synthetic resin layer in said composite synthetic resin material is a

*Numbers in the margin indicate pagination in the foreign text.

nearly columnar shape, and the outside synthetic resin layer has a nearly cylindrical shape.

4. The method of manufacture of any of Claims 1 to 3 wherein both the inside synthetic resin layer and the outside synthetic resin layer in said composite synthetic resin material have a nearly cylindrical shape, and said composite synthetic resin material also contains a core synthetic resin layer having a nearly columnar shape which is surrounded by the inside synthetic resin layer.

5. The method of manufacture of any of Claims 1 to 4 wherein a covering member, which covers the boundary region between at least the inside synthetic resin layer and the outside synthetic resin layer, is disposed on at least one side of each end of said composite synthetic resin material and subjected to an in-mold molding.

3. Detailed Specifications

(Technical Field)

The present invention relates to a method for manufacturing a compression molding having a multilayer structure and made of a synthetic resin which is embodied expediently as containers and /2 container lids above all.

(Prior Art)

A compression molding having a multilayer structure and made of a synthetic resin which is embodied expediently in containers or container lids above all, and its method of manufacture are disclosed in the publication of Tokukai JP-A No. S62-184817. Such a compression

molding having a multilayer structure is equipped with an inside synthetic resin layer and an outside synthetic resin layer surrounding substantially this entire inside synthetic resin layer. The inside synthetic resin layer and the outside synthetic resin layer comprise mutually different synthetic resins. For example, the inside synthetic resin layer comprises a synthetic resin having high gas barrier properties, while the outside synthetic resin layer comprises a synthetic resin outstanding in mechanical characteristics and hygienic properties. Such a compression molding having a multilayer structure is manufactured by generating the inside synthetic resin layer and the outside synthetic resin layer substantially surrounding this entire inside synthetic resin layer, and compression molding this composite synthetic resin material into a prescribed shape.

(Problems of the Prior Art)

Although the above-mentioned compression molding having a multilayer structure is remarkably beneficial as a container or container lid above all, the problems, as follows, exist in the manufacturing process thereof. That is to say, in the prior art, in order to manufacture the above-mentioned compression molding having a multilayer structure, it is necessary to generate a composite synthetic resin material containing the inside synthetic resin layer and the outside synthetic resin layer substantially surrounding this entire inside synthetic resin layer. However, as shown in the above-

mentioned publication of Tokukai JP-A No. S62-184817, in order to generate the composite synthetic resin material substantially surrounding the inside synthetic resin layer, it is necessary to intermittently extrude the inside synthetic resin in the extrusion flow pass of the outside synthetic resin to allow it to flow therein. Therefore, an opening/closing valve mechanism is required for intermittently controlling the extrusion of the inside synthetic resin. This opening/closing valve mechanism is relatively complex and expensive. In addition, the opening/closing control of the opening/closing valve mechanism itself is not easy enough either. Consequently, in the prior art, this is a cause of relatively high manufacturing costs, so the manufacturing cost of the compression molding having a multilayer structure is relatively high.

(Object of the Invention)

The present invention was accomplished in view of the above-mentioned circumstances and the main object thereof is to provide a novel and improved method of manufacture which enables the manufacture of a compression molding having a multilayer structure with prescribed characteristics at a relatively low cost.

(Means for Solving the Problems and Effects)

The inventors of the present invention discovered that the compression molding having a multilayer structure which characteristics can be sufficiently satisfied could be manufactured even if a composite synthetic resin material in which the outside

synthetic resin layer simply surrounds the flank of the inside synthetic resin layer (both end faces of the inside synthetic resin layer are at least partially exposed) is used in place of a composite synthetic resin material in which the outside synthetic resin layer surrounds substantially the entire inside synthetic resin layer, by compressing such a composite synthetic resin material in the axial direction thereof and compression molding it into the prescribed shape.

That is, according to the present invention a method of manufacture is provided characterized by being comprised by generating a composite synthetic resin material containing an inside synthetic resin layer and an outside synthetic resin layer surrounding the flank of this inside synthetic resin layer, and compressing said complex synthetic resin material in the axial direction and compression molding it into a compression molding having a multilayer structure with a prescribed shape.

A composite synthetic resin material in a form in which the outside synthetic resin does not substantially surround the inside synthetic resin layer but simply surrounds the flank thereof can be generated by continuously extruding the inside synthetic resin layer and the outside synthetic resin layer and cutting the extruded composite synthetic resin in the traverse direction to the axial /3 direction. Consequently, a relatively complex and expensive opening/closing valve mechanism is not needed for the intermittent

extrusion, and a compression molding having a multilayer structure having prescribed characteristics can be manufactured substantially more simply and inexpensively than in past cases.

(Preferred Embodiments of the Invention)

The preferred embodiments of the method of manufacture of the present invention will now be described in detail with reference to the appended drawings.

Figure 1 simply illustrates a mode of generating the composite synthetic resin material. An extruder 2, in which only the end of the extrusion flow pass is illustrated, is equipped with a composite extrusion flow pass 8 comprising an inside synthetic resin layer extrusion flow pass 4 and an outside synthetic resin layer extrusion flow pass 6 coaxially surrounding this inside synthetic resin layer extrusion flow pass 4. The outside synthetic resin layer extrusion flow pass 6 has an extrusion hole 10 which can be round. The inside synthetic resin layer extrusion flow pass 4 also has an extrusion hole 12 which can be round. This extrusion hole 12 opens into the outside synthetic resin layer extrusion flow pass 6 slightly upstream from the extrusion hole 10 of the outside synthetic resin layer extrusion flow pass 6. An inside synthetic resin layer 14, in a hot-melt state, is continuously extruded through the inside synthetic resin layer extrusion flow pass 4. An outside synthetic resin layer 16, in a hot-melt state, is continuously extruded through the outside synthetic resin layer extrusion flow pass 6. Thus, a composite

synthetic resin 18 containing the inside synthetic resin layer 14 having a substantially columnar shape and the outside synthetic resin layer 16 having a substantially cylindrical shape coaxially surrounding the circumferential flank of this inside synthetic resin layer 14 is extruded from the extruder 2. The extruded composite synthetic resin is cut in the traverse direction to the axial direction (i.e., extrusion direction), and preferably, the substantially perpendicular direction thereto, as shown by the dashed double-dotted line. Thus, a composite synthetic resin material 20 is generated.

The above-mentioned extruder 2 itself should be a well-known one to generate the composite synthetic resin material 20. Therefore, a detailed description of the extruder 2 will be omitted.

As described later, when the compression molded molding is a container or container lid for drinks, foods, and the like, it is convenient that the inside synthetic resin layer 14 in the composite synthetic resin material 20 comprise a synthetic resin having high gas barrier properties, and the outside synthetic resin layer 16 comprise a synthetic resin having outstanding mechanical characteristics and hygienic properties. An olefin-vinyl alcohol copolymer resin, polyamide resin, high barrier polyester-based resin, nitrile-based resin, vinyl chloride-based resin and vinylidene chloride-based resin can be cited for the synthetic resin having high gas barrier properties. In addition, an olefin-based resin, styrene-

based resin, acryl resin, methacryl resin, polyester-based resin, and polycarbonate resin can be cited for the synthetic resin outstanding in mechanical characteristics and hygienic properties.

Figure 2 illustrates simply a container lid 22 as an example of a molding. This container lid 22 has a round top face wall 24 and a cylindrical skirt wall 26 which hangs from the perimeter of this top face wall 24. As is well known, a male screw for screwing into a female screw formed on the outer peripheral face of a container mouth head portion can be formed on the inner circumferential face of the skirt wall 26, and moreover, a so-called pilfer-proof ridge portion, wherein a latching projection or protruding piece is formed on the inner peripheral face, can be provided (the male screw and pilfer-proof ridge portion are not shown for simplification of the drawing) at the lower end of the skirt wall 26.

In the present invention, it is important to compress the composite synthetic resin material 20 in the axial direction thereof (i.e., extrusion direction) while compression molding the above-mentioned composite synthetic resin material 20 and make it into the /4
container lid 22. Figures 3-A to 3-D simply illustrate an example of the compression molding step of compression molding the composite synthetic resin material 20 into the container lid 22. A compression molding machine 28 embodies an upper male mold 30 and a lower female mold 32. A recess 34, which provides the mold cavity, is formed on the inferior surface of the upper male mold 30. An expanded portion

36 is disposed on the lower end portion of the recess 34 in which the shape of the traverse section is round. The lower female mold 32 comprises a middle member 38 and an annular outside member 40. The middle member 38 has a columnar portion 42 extending upward. Two stepped portions are formed in the annular outside member 40 arranged on the outside of the columnar portion 42 of the middle member 38, and an upper end portion 44 and an intermediate portion 46 having a somewhat larger diameter than the upper end portion are present. The external shape of the upper end portion 44 corresponds to the inner diameter of the main portion of the above-mentioned recess 34 in the upper male mold 30, while the external shape of the intermediate portion 46 corresponds to the inner diameter of the expanded portion 36 of the above-mentioned recess 34 in the upper male mold 30. The upper male mold 30 and the lower female mold 32 move symmetrically in directions in which they approach one another or separate from one another by elevatingly moving the, e.g., upper male mold 30. When the compression molding is started, as shown in Figure 3-A, the upper male mold 30 is elevated and is separated from the lower female mold 32. The composite synthetic resin material 20 is supplied to the top middle portion of the columnar portion 42 of the lower female mold 32. In the present invention, as described above, it is important to compress the composite synthetic resin material 20 in the core axial direction. Therefore, it is important to supply the composite synthetic resin material 20 to a prescribed position of the lower

female mold 32 by extending the core axis thereof in the compression direction, i.e., the vertical direction in Figure 3-A. Since the composite synthetic resin material 20 is in a hot-melt state, it flows and is deformed somewhat after it is extruded from the extruder 2 until it is supplied to the compression molding machine 28 (therefore the composite synthetic resin material 20 shown in Figure 3-A is somewhat more flattened, and at the same time, more spheroidized than the composite synthetic resin material 20 shown in Figure 1). Next, as shown in Figures 3-B to 3-D, the upper male mold 30 descends slowly. Thus, the composite synthetic resin material 20 is compressed gradually in the vertical direction between the upper male mold 30 and the lower female mold 32, and flows along the mold cavity provided between the upper male mold 30 and the lower female mold 32. As comprehended by comparatively referring to Figures 3-B, 3-C and 3-D, during the compression molding, the top and inferior surface portions of the composite synthetic resin material 20 come in contact with the upper male mold 30 and lower female mold 32, respectively, and are cooled. The flowability decreases at a relatively fast speed, and therefore the material in the intermediate portion mainly flows appropriately in the vertical direction in accordance with the compression. Thus, as illustrated clearly in Figure 2, in the container lid 22 that is compression molded lastly, the inside synthetic resin layer 14 extends almost entirely to the container lid 22 without being maldistributed at a specific site. In

the composite synthetic resin material 20 prior to the compression molding, the inside synthetic resin layer 14 is not entirely surrounded by the outside synthetic resin layer 16, and the inside synthetic resin layer 14 is exposed to the outside on the top and inferior surfaces of the composite synthetic resin material 20. Therefore, in the compression molded container lid 22, as shown in Figure 2, the inside synthetic resin layer 14 is exposed locally to the outside in the center of both the inside and outside of the top face wall 24. However, because this exposure of the inside synthetic resin layer 14 is limited to a markedly small site on the compressed surface, the risk that problems attributable thereto, such as the peeling of the inside synthetic resin layer 14 and the outside synthetic resin layer 16, will not substantially develop.

If desired, while compression molding the composite synthetic resin material 20, as shown by the dashed double-dotted line in Figures 2 and 3-A, covering members 48 and 50 formed in advance can be so disposed at both end faces of the composite synthetic resin material 20 (or, either or both of them) that the boundary regions /5
of at least the inside synthetic resin layer 14 and the outside synthetic resin layer 16 are covered. The covering members 48 and 50, which can be a metal foil, synthetic resin film, paper foil or laminates of these, can be positioned on the top of the lower female mold 32 and on the inferior surface of the upper male mold 30 by means of an appropriate system.

Figure 4 illustrates a modified aspect in which the composite synthetic resin material is generated. In this modified aspect, an extruder 102 in which just the end portion of the extrusion flow pass is illustrated is equipped with an inside synthetic resin layer extrusion flow pass 104 and an outside synthetic resin layer extrusion flow pass 106 coaxially surrounding this inside synthetic resin layer extrusion flow pass 104, and also a core synthetic resin layer extrusion flow pass 103 coaxially surrounded by the inside synthetic resin layer extrusion flow pass 104. This core synthetic resin layer extrusion flow pass 103 has an extrusion hole 109 which can be round. This extrusion hole 103 opens into the inside synthetic resin layer extrusion flow pass 104 slightly upstream from an extrusion hole 110 of the inside synthetic resin layer extrusion flow pass 104. A core synthetic resin layer 113, in a hot-melt state, is extruded continually through the core synthetic resin layer extrusion flow pass 103, an inside synthetic resin layer 114, in a hot-melt state, is continuously extruded through the inside synthetic resin layer extrusion flow pass 104, while an outside synthetic resin layer 116, in a hot-melt state, is continuously extruded through the outside synthetic resin layer extrusion flow pass 106. Thus, a composite synthetic resin 118 containing the nearly columnar core synthetic resin layer 113, the nearly cylindrical inside synthetic resin layer 114 coaxially surrounding this core synthetic resin layer 113, and the nearly cylindrical outside synthetic resin layer 116

coaxially surrounding the circumferential flank of the inside synthetic resin layer 114 is extruded from the extruder 2. This extruded composite synthetic resin is cut in substantially a perpendicular direction to the core axial direction (i.e., extrusion direction), as shown by the dashed double-dotted line, by a cutting means that may be a rotary cutting blade. Thus, a composite synthetic resin material 120 is generated. The core synthetic resin layer 113 may be a suitable synthetic resin that is different from both the inside synthetic resin layer 114 and the outside synthetic resin layer 116, but it may be the same synthetic resin as the outside synthetic resin layer 116.

The above-mentioned extruder 102 itself also should be a well-known one to generate the composite synthetic resin material 120. Therefore, a detailed description of the extruder 102 will be omitted.

The composite synthetic resin material having a three-layer configuration shown in Figure 4 can be compression molded into the container lid 122 shown in Figure 5 by substantially the same system as the system described with reference to Figures 3-A to 3-D. If desired, a composite synthetic resin material having a four-layer or higher configuration can be generated and compression molded into the container lid 122, as shown in Figure 5, by substantially the same system as the system described with reference to Figures 3-A to 3-D.

Although the preferred embodiments of the present invention were described in detail above with reference to the appended drawings,

the present invention is not limited to such specific examples, and of course, various modifications and alterations are possible without deviating from the scope of the present invention.

4. Brief Description of the Drawings

Figure 1 is a simple cross section showing a mode in which the composite synthetic resin material is generated in the preferred embodiments of the method of manufacture of the present invention.

Figure 2 is a simple cross section showing a container lid manufactured in a preferred embodiment of the method of manufacture of the present invention.

Figures 3-A, 3-B, 3-C and 3-D are simple partial cross sections showing the step of compression molding the container lid shown in Figure 2 by using the composite synthetic resin material generated according to the mode shown in Figure 1.

Figure 4 is a simple cross section showing a modified mode in which the composite synthetic resin material is generated. /6

Figure 5 is a simple cross section showing a container lid manufactured by compression molding the composite synthetic resin material shown in Figure 4.

2: extruder; 103: core synthetic resin layer extrusion flow pass; 4 and 104: inside synthetic resin layer extrusion flow passes; 6 and 106: outside synthetic resin layer extrusion flow passes; 113: core synthetic resin layer; 14 and 114: inside synthetic resin layers; 16 and 116: outside synthetic resin layers; 20 and 120:

composite synthetic resin materials; 22 and 122: container lids; 28: compression molding machine; 30: upper male mold; 32: lower female mold; 48 and 50: covering member

Figure 1

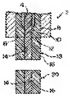


Figure 2

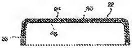
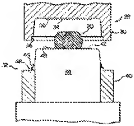


Figure 3-A   Figure 3-B



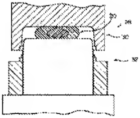
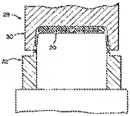


Figure 3-C   Figure 3-D   /7



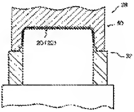


Figure 4

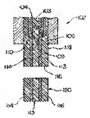


Figure 5